Question3

Solution :

First, put all trains that arrive before midnight and leave after midnight to a new data set midnight_train and put the other trains that arrive and leave on the same day as another data set normal_train.

Pop one train from midnight_train and create a timeline starting at the leave time of the train and end at the arrival time of the train. Then, combine the timeline and the normal_train, choose the train that does not conflict with the timeline and have the earliest end time, fill it in and delete it from normal_train until no more train can fill in this timeline.

Repeat this step until there is no train in midnight_train or normal_train.

If there is no train in normal_train, the minimum number of platforms is the number of trains that arrive before midnight and leave after midnight.

If there is no train in midnight_train, create a new timeline that includes a whole day and fill in like above until there is no train in normal_train. The minimum number of platforms is the number of timelines that we created.

Proof :

Because we try to fill in the maximum number of trains in one timeline by greedy method, the total number of trains is a fixed number. So this is the result of the minimum number of platforms.